Pulmonary Rehabilitation Part Two

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Learning Objectives:

- Integrate pharmacological agents into pulmonary rehabilitation (PR).
- Integrate oxygen therapy into a PR program.
- Integrate ventilatory muscle training for PR patients.
- Integrate general exercise training for PR patients.
- Describe PR for patients with conditions other than obstructive disease.
- Assess outcomes for PR patients.
- Explain the implications of special issues associated with PR; such as, patient adherence, ethical issues and social support.

Rehabilitation Interventions Overview

Interventions (RC):

- Education on RC topics
- Dyspnea management
- Pharmacotherapy
- Oxygen therapy
- Inspiratory muscle training
- Exercise training
- Smoking cessation
- Sleep assessment and therapy

FYI - Click for AARC CPG Pulmonary Rehabilitation
http://www.rcjournal.com/cpgs/pdf/05.02.616.pdf

Interventions (non-RC):

- Occupational therapy
- Physical therapy
- Nutritional support
- Psychosocial support, including end-of-life care
- Alternative medical support

Initiation of rehabilitation

- After first exacerbation
- During intensive care
- Before and after surgical procedures; e.g., lung volume reduction surgery (LVRS)
- When the patient is ready

Duration of rehabilitation

- 6-12 weeks

Pharmacological Therapy

Components of COPD

- Airflow obstruction - decreased FEV_1
- Hyperinflation - increased IC/TLC
- Inflammation
- Systemic manifestations, due to oxidative stress, immunopathology result in:
  - decreased free fat mass;
  - impaired muscle function;
  - dyspnea; etc.

Medication types for COPD

- Immunizations: influenza; pneumococcus
- Bronchodilators
- Corticosteroids
- Combination therapy
- Mucolytics
- Antibiotics

Bronchodilators

- Benefits
  - decrease airway resistance
  - decrease hyperinflation
  - decrease dyspnea - may be due to decreased resistance and/or decreased hyperinflation
  - note - patients may improve symptoms, although FEV_1 remains unchanged.

Bronchodilators

- Short-acting beta-agonist (SABA)
  - albuterol, as needed
  - all stages

Bronchodilators

- Long-acting beta-agonists (LABA)- moderate-to-severe COPD
  - salmeterol (Serevent)
  - formoterol (Foradil)
  - indacaterol (Arcapta Neohaler)
    - once daily
    - FDA approved in July, 2011
    - better than tiotropium for COPD??

Bronchodilators

- Short-acting anticholinergic - ipratropium (Atrovent)
- Long-acting anticholinergic - tiotropium (Spiriva)
  - moderate-to-severe
  - improves lung function
  - decreases dyspnea
  - daily - increases adherence

Bronchodilators

- nonspecific phosphodiesterase (PDE) inhibitors; e.g., theophylline
  - high risk/benefit ratio - adverse effects
  - low cost
  - reserved for patients who cannot use aerosols

Bronchodilators

- PDE4 inhibitors; e.g., roflumilast (Daliresp)
  - included in Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines for severe COPD
  - daily tablet
  - bronchodilator
  - decreases inflammation
  - decreases exacerbations

Click for information on PDE4 inhibition
http://www.thinkcopdifferently.com/Think%20COPDifferently/PDE4%20inhibition%20in%20COPD.aspx

FYI - Click to download article on PDE4 inhibition
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2707810/

Bronchodilator combinations

- Moderate-to-severe
- Beta-agonist and anticholinergic - greater response than either one, alone
  - formoterol and tiotropium - persistent symptoms
  - albuterol and ipratropium - intermittent symptoms

FYI - Click to download GOLD COPD guidelines 2010
http://www.goldcopd.org/guidelines-global-strategy-for-diagnosis-management.html

Corticosteroids

- Oral corticosteroids; e.g., prednisone - exacerbations
- Inhaled corticosteroids (ICS)
  - severe-to-very severe COPD
  - not recommended as monotherapy

FYI - Click to download GOLD COPD pocket guide
http://www.goldcopd.org/guidelines-pocket-guide-to-copd-diagnosis.html

Combined steroid and LABA

- Indication - in addition to tiotropium for severe and very severe COPD
- Benefits
  - decreased exacerbations - cost effective
  - improved symptoms and HRQoL
  - decreased mortality
- Preparations
  - formoterol/budesonide (Symbicort)
  - salmeterol/fluticasone (Advair)

Mucolytic agents

- Oral n-acetylcysteine (COPD):
  - may improve pulmonary function
  - may reduce risk of hospitalization
  - effects may be due to antioxidant activity
- No evidence supporting nebulized n-acetylcysteine
- No evidence supporting nebulized Pulmozyme for COPD

Mucolytic agents

- Oral mucolytics available outside the U.S.A. (not FDA-approved)
  - carbocysteine
  - ambroxol

Antibiotics

- Indication - evidence of bacterial infection
- Recurrent infections indicate prolonged courses
- Not for routine prophylaxis

Medications and rehabilitation

- Instruction and monitoring medication self-administration is integral to rehabilitation.
- Selection of specific agent(s) should be based on:
  - patient response
  - cost
  - patient's ability to self-administer

FYI - Click to download GOLD therapy-by-stage
http://img.medscape.com/fullsize/migrated/editorial/journalcme/2008/17618/fromer.fig2.gif

Medications and rehabilitation

- Adherence can be problematic - it does affect outcomes
- Non-adherence may be due to:
  - memory impairment
  - cost
  - perceived difficulty (too much stuff)
  - perception on ineffectiveness

Medications and rehabilitation

- Encouraging adherence
  - memory aids
  - cheaper drugs
  - assistance with payment
  - patient education on expectations
  - drugs with lesser frequency
  - follow-up

Oxygen Therapy

Indications for O2 therapy

- Manage hypoxemia at rest and during exercise.
- Increase exercise capacity for patients without hypoxemia during high-intensity training.

Benefits of O2 therapy

- Prolongs survival for patients with severe COPD and resting hypoxemia
  - long term oxygen therapy (LTOT) - ≥ 15 hours/day

Benefits of O2 therapy

- Increases endurance during high-intensity exercise
  - permits greater exercise intensity
  - decreases respiratory rate
  - decreases dynamic hyperinflation
  - decreases leg fatigue
- Prevents nocturnal desaturation

Nocturnal O2 therapy

- COPD - may desaturate at night and require more O2
- COPD + OSA (overlap syndrome)
  - polysomnography needed for suspected patients
  - managed by OSA guidelines

Adverse effects

- O2 tissue toxicity - not at low FIO2
- Oxygen-induced hypoventilation
  - very rare
  - during exacerbations
  - high FIO2
- Accidents
  - smoking with O2
  - cylinder mishaps
  - liquid O2 spills

Click to see extreme smoker
http://tobacco.mededu.miami.edu/tobacco/studyPlan/slides_az/slide-j.jpg

Physiological criteria for home O2

- Continuous O2
  - PaO2 ≤ 55 mm Hg or SaO2 ≤ 88% OR
  - PaO2 = 56-59 mm Hg or SaO2 = 89% AND
    - dependent edema from CHF OR
    - pulmonary hypertension
  - Desaturation within first minute of six minute walk test (6 MWT) - suggested by study

Physiological criteria for home O2

- Nocturnal O2 only - PaO2 ≤ 55 mm Hg or SaO2 ≤ 88% during sleep OR drop in SaO2 > 5%
- Exercise O2 only - PaO2 ≤ 55 mm Hg or SaO2 ≤ 88%

Prescription for LTOT

- Prescribe O2 for PaO2 ≥ 60 mm Hg or SaO2 ≥90%
- Add 1 L/min additional during exercise and for rest after exercise OR titrate O2 flow for PaO2 ≥ 60 mm Hg or SaO2 ≥90%
- If the hypoxemia identified during exacerbation, recheck ABGs 30-90D to determine need for LTOT

Home O2 systems

- Compressed gas cylinder systems
  - require no electrical power
  - limited duration
  - limited portability
- Liquid O2 systems
  - require no electrical power
  - long duration (860:1)

Click to see various liquid O2 systems
http://www.portableoxygenconcentrators.com/page9.html

Home O2 systems

- Compressed gas cylinder systems
  - require no electrical power
  - limited duration
  - limited portability
- Liquid O2 systems
  - require no electrical power
  - long duration (860:1)
- Concentrators
  - require electrical power
  - portable units available

Click to see various O2 concentrators
http://www.oxygenconcentratorstore.com/

Home O2 devices

- Standard nasal cannula "nose-hose"
- Reservoir nasal cannula
  - bolus of O2 during inspiration
  - conserves O2 supply
- Pulsed flow cannula
  - O2 flow during inspiration, only
  - conserves O2 supply
  - increased comfort (less drying)

Click to see a reservoir device
http://ccn.aacnjournals.org/content/22/4/41/F2.expansion
Click to see a pulsed flow device
http://3.bp.blogspot.com/_q6mZ_-srugs/TEJ0u_7_Sal/AAAAAAAAACA/eGKgHCQj_gM/s1600/Electrical+Pulse-Demand+Oxygen+System.jpg

Home O2 devices

- Transtracheal oxygen therapy (TTOT)
  - aesthetically desirable - psychosocial benefits
  - permits more active lifestyle
  - lesser flow rate - conserves O2
  - can combine with pulse delivery device

Click to see TTOT device
http://health.ucsd.edu/specialties/pulmonary/procedures/PublishingImages/TTO1.jpg
Click for more information on TTOT device. View animated illustration and clinician page.
http://www.tto2.com/

Home O2 devices

- Transtracheal device (TTOT)
  - aesthetically desirable - psychosocial benefits
  - permits more active lifestyle
  - lesser flow rate - conserves O2
  - can combine with pulse delivery device
  - less discomfort - increases adherence
  - treats OSA
  - requires special knowledge and skills
  - requires minor surgery

FYI - Click to print article on TTOT
http://www.rtmagazine.com/news/16499-transtracheal-oxygen-therapy-the-best-kept-secret-in-medicine

Patient education on O2 therapy

- Topics
  - devices
  - device usage - how & when
  - troubleshooting
  - contacts for devices & supplies
- Competency-based evaluations
  - knowledge - examinations
  - procedures - performance checklists

FYI - Click for website on patient's perspective of home O2 (a patient resource)
http://www.portableoxygen.org/

Patient adherence to LTOT

- LTOT adherence is 45 - 70%
- Reasons for non-adherence
  - hassle & expense of supplies
  - limitation of mobility
  - nasal irritation
  - embarrassment
  - fear of dependence

Patient adherence to LTOT

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- Reasons for non-adherence
  - hassle & expense of supplies
  - limitation of mobility
  - nasal irritation
  - embarrassment
  - fear of dependence
  - inadequate communication
  - perception of no benefit
  - desire for freedom to smoke

Methods to improve adherence

- Instruction on need & benefits
- Regular follow-up
- Family instruction & social support
- Portable delivery systems - small and light

Methods to improve adherence

- Instruction on need & benefits
- Regular follow-up
- Family instruction & social support
- Portable delivery systems - small and light
- Concentrators - avoid problems with refills and deliveries
- TTOT - decreases embarrassment
- Smoking cessation, fire safety

Click for video on smoking with O2 (1.2 min)
http://www.youtube.com/watch?v=D7QpSfvyOek

Travel with O2

- Important enabler for rehab patients.
- Commercial aircraft pressurized to 8000 ft.
- O2 required for patients with:
  - sea level RA PaO2 < 73
  - FEV_1 < 1.5 (maybe)
- Altitude simulation test may be needed

FYI - Click for article on altitude simulation test
http://chestjournal.chestpubs.org/content/133/4/1002.full.pdf+html

Travel with O2

- Check with airline before flight
- Airline security must be notified
- Liquid oxygen (LOX) systems may NOT be carried on aircraft (store with luggage)

FYI - Click for article for patients traveling with O2
www.accpstorage.org/newOrganization/patients/TravelingwithOxygen.pdf

Travel with O2

- Check with airline before flight
- Airline security must be notified
- LOX systems may NOT be carried on aircraft (store with luggage)
- Portable O2 concentrator is best; but requires approval by airline
- CPAP devices require external power source
- Some airlines provide O2 source for a fee

Pulse oximetry

- Oximeters are available at Walmart
- Two-edge sword - patient requires thorough instruction
- Purposes:
  - home O2 monitoring
  - sleep apnea monitoring
  - monitoring patients with congenital heart disease
  - high altitude travel & activities

Pulse oximetry

- Insurers recognize oximetry to:
  - determine appropriate home oxygen liter flow
  - monitor patients on home ventilators
  - adjust for change in the patient's condition
  - wean patients from home oxygen.

FYI - click for patient information on pulse oximetry
http://www.copd-alert.com/OximetryPG.pdf

Inspiratory Muscle Training

Concepts

- Weakness - reduced force that is not changed by rest
- Fatigue - reduced force that changes with rest (occurs in normals)
- Strength - maximum force generated (PI_{MAX})

FYI - click for ATS respiratory muscle testing statement
http://ajrccm.atsjournals.org/cgi/content/full/166/4/518

Concepts

- Weakness - reduced force that is not changed by rest
- Fatigue - reduced force that changes with rest (occurs in normal patients)
- Strength - maximum force generated (PI_{MAX})
- Endurance
  - PI sustainable over time - inspiratory muscles
  - maximum voluntary ventilation (MVV) - inspiratory and expiratory muscles

Rationale for IMT

- COPD patients typically have weak inspiratory muscles
- Exercises intend to increase the strength and/or endurance of ventilatory muscles, thereby:
  - decreasing breathlessness
  - increasing ventilatory muscle efficiency
  - increasing exercise capacity - effective, even for normal individuals

Conditions that may benefit

- Asthma
- Heart failure rehabilitation
- Bariatric surgery - preoperatively
- Thoracic restrictive disease
- Failure to wean from mechanical ventilation

Conditions that benefit

- Selected COPD patients
  - moderate-to-severe; but, not end-stage
  - exertional dyspnea
  - decreased PI_{MAX} (>80 cm H2O excludes weakness)
  - motivated - will adhere to training

Exercise techniques

- Types
  - sustained hyperpnea
  - inspiratory resistance
- Intended goals
  - strength - high workload, few repetitions
  - endurance - moderate workload, many repetitions

Exercise devices

- Threshold resistors (preferred)
- Flow restrictors - patient can reduce load by decreasing flow
- Incentive spirometers - ineffective

Click to see Respironics Threshold IMT™ device
http://thresholdimt.respironics.eu/

Click to see Micromedical MRNA™ device
http://www.respiratorymuscles.com/aboutus/respiratoryprofile.htm

Click to see Powerbreathe™ device
http://www.powerbreathe.com/

Exercise prescription

- Frequency ≥5 days/week
- Duration 30 min/day, continuous or divided into two sessions
- Intensity > 30% initial PI_{MAX} (adjusted as tolerated)

Measured outcomes

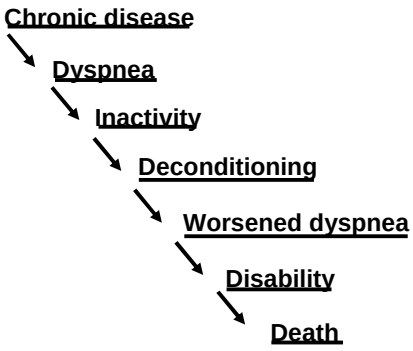
- PI_{MAX}
- Dyspnea; e.g., by BDI/TDI indexes
- Health status; e.g., by SGRQ
- Exercise performance; e.g., by 6 MWD

General Exercise Training

Physical reconditioning exercises

- Rationale - to reverse the effects of inactivity that are due to dyspnea
- The most important factor in pulmonary rehabilitation for symptomatic respiratory disease
- Beneficial to almost everyone, except:
  - pure cardiac pump failure
  - degenerative neuromuscular diseases

Chronic disease cascade



Benefits of reconditioning exercises

- Increased $VO2_{MAX}$
- Increased muscle strength and endurance
- Improved muscle coordination
- Increased muscle mass, decreased adipose tissue
- Improved sense of well-being
- Improved chance of survival (possibly)

Regimen benefits

- Aerobic training - increases endurance
  - lower extremities
  - upper extremities
- Strength training - increases muscle strength and muscle mass
  - lower extremities
  - upper extremities

Regimen benefits

- Aerobic training
  - high-intensity exercise - exercise at levels near individual peak capacity produces greatest physiological benefit; however,
  - both low and high-intensity exercises produce clinical benefits

Exercises

- Leg exercises
  - walking
  - treadmill walking
  - cycle ergometer
  - stair climbing
- Arm exercises
  - arm ergometer
  - weights
  - elastic resistance bands

Exercise prescription

- Developed by:
  - MD, and/or
  - Physical therapist (PT) - essential for targeting muscle groups for strength training and/or
  - Exercise physiologist and/or
  - RCP
- Implemented by:
  - PT and/or
  - RCP and/or
  - Rehab RN

Exercise implementation

- Recommended frequency and duration - 3 times/week; 8-12 weeks??
- Increase intensity as tolerated
- Monitoring
  - pulse oximetry - SpO2 and heart rate
  - respiratory rate
  - reported dyspnea

Click to see exercise prescription table
http://www.pulmonaryrehab.com.au/index.asp?page=98

Maintenance program

- Training effects can be lost after one month without exercise
- Maintenance programs
  - Home exercise program
  - Monthly outpatient exercise program

FYI - Click to see examples of training programs
http://www.pulmonaryrehab.com.au/index.asp?page=97

Adjunctive therapeutics

- Supplemental oxygen
- Noninvasive positive pressure ventilation (NPPV)
  - better than O2? (small study)
  - nocturnal - effects carry over to day time
  - during exercise
    - uncomfortable
    - unwieldy

Adjunctive therapeutics

- Heliox
  - low density gas decreases WOB
  - collective evidence does not support effectiveness with PR
- Neuromuscular electric stimulation (NMES) - low voltage stimulation of motor nerves
  - increases recovery of muscle strength
  - more research needed
  - muscles without exercise??

FYI - Click for article on NMES and COPD
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3071998/pdf/cln-66-03-401.pdf

Rehabilitation for Miscellaneous Conditions

Conditions that may benefit

- Obstructive conditions
  - asthma
  - cystic fibrosis
  - diffuse bronchiectasis
- Restrictive conditions
  - pulmonary fibrosis
  - sarcoidosis
  - ARDS survivors
  - collagen vascular diseases
  - thoracic restriction; e.g., kyphoscoliosis

Conditions that may benefit

- Neuromuscular disease; e.g., Guillain-Barre syndrome
- Pulmonary vascular disease - pulmonary hypertension
- Lung cancer
- Recovery from thoracic surgery:
  - transplants
  - lung volume reduction surgery (LVRS)

Non-COPD programs

- Same goals as for COPD
  - improve HRQoL
  - increase exercise capacity
- Different program content
  - instruction on different medications
  - disease-specific physical and occupational therapy
  - exercises focusing on different muscle groups

Asthma program

- Patient groups
  - adults, including pregnant women
  - children (K+)
  - parents
- Instructional delivery
  - certified asthma educator
  - computer-based programs
  - asthma camps

FYI - click for National Asthma Education Certification Board website
http://www.naecb.org/

Asthma program

- Educational topics
  - asthma pathophysiology
  - asthma triggers
  - early warning signs
  - PEF monitoring
  - medications & self-administration techniques

Asthma program

- Exercise
  - warm up - important
  - self-monitor for exercise-induced bronchospasm
  - submaximal exercises
    - aerobics
    - walking
    - yoga

FYI - click for Asthma Education Center with online videos on asthma topics
http://asthmaeducationcenter.net/

Cystic fibrosis program

- Education topics
  - lung clearance techniques
  - medications & self-administration techniques
  - nutrition
  - infection control

Cystic fibrosis program

- Exercise precautions
  - may require supplemental O2
  - avoid hot environments - sweating
  - maintain hydration with electrolytes
  - maintain nutrition

Restrictive lung disease

- Education topics
  - disease pathophysiology
  - energy conservation
  - oxygen therapy
  - relaxation techniques
  - medications
  - nutrition
  - breathing retraining - pursed lip breathing????

Restrictive lung disease

- Exercise training
  - may not tolerate
  - may not benefit - desaturate with exercise
  - supplemental oxygen may be required
  - NPPV may be required

Neuromuscular disease

- Education topics
  - pathophysiology
  - medications
  - cough assist; e.g., mechanical in/ex sufflator
  - NPPV devices & procedures

Neuromuscular disease

- Exercise training - condition specific
  - strength and endurance training
  - respiratory muscle training
- Exercise precautions
  - some patients do not benefit; e.g., spinal/bulbar muscular atrophy
  - avoid IMT in patients with hypercapnea

Special Issues

Issues

- Outcome assessment
- Patient adherence
- Ethical & end-of-life issues
- Social & recreational support

Outcome assessment

- Components
  - Clinical
  - Behavioral
  - Health
  - Service

Click to see and/or download outcome matrix
http://www.upcra.org/images/111507-handout03.doc

FYI - click for AACVPR statement on outcome assessment
http://journals.lww.com/jcrjournal/Fulltext/2009/11000/Patient_and_Program_Outcome_Assessment_in.11.aspx

Outcome assessment

- Clinical component
  - overall management
    - BODE index
    - ADL assessment
  - exercise testing and training
    - maximal & submaximal exercise test
    - heart rate
    - SpO2

Click to see and/or download BODE index scoring
http://www.pulmonaryrehab.com.au/pdfs/BodeIndexForCOPD.pdf

Outcome assessment

- Clinical component
  - strength & flexibility training
  - nutrition & weight management
    - body mass index
    - nutritional biochemical markers
  - psychosocial management
    - mood
    - cognitive function
  - smoking cessation

Outcome assessment

- Behavioral component
  - overall management
    - knowledge and self-care actions
    - medication adherence
    - supplemental O2 adherence
  - exercise testing & training
    - exercise compliance
    - energy expenditure

Outcome assessment

- Behavioral component
  - breathing retraining - effectiveness
  - bronchial hygiene - mucus clearance
  - nutrition & weight management
    - diet & exercise adherence
    - physical activity logs

Outcome assessment

- Behavioral component
  - breathing retraining - effectiveness
  - bronchial hygiene - mucus clearance
  - nutrition & weight management
    - diet & exercise adherence
    - physical activity logs
  - psychosocial management
    - coping mechanisms
    - social support network
  - smoking cessation - stage of change

Outcome assessment

- Health component
  - healthcare utilization
  - adverse events during sessions
  - HRQoL
- Service component
  - patient satisfaction
  - performance measures
    - cost per patient
    - program cost
    - completion rate

Patient adherence

- Extent of problem
  - 50% of all patients adhere to treatment recommendations
  - 37% of patients with lung disease adhere to treatments
- Components of problem
  - medications
  - oxygen therapy
  - exercise
  - NPPV

Patient adherence

- Reasons for non-adherence
  - forgetting
  - inadequate communications from physicians/other caregivers
  - medication side effects
  - perception that interventions do not work
  - cost of medications
  - inconvenience

Patient adherence

- Measures to improve adherence
  - reminders - telephone, e-mail
  - enhanced physician communications
  - set realistic goals for exercise
  - establish rewards for desirable behaviors
  - focus on positive outcomes
  - telemonitoring - there's an 'app'

FYI - click for Smartphone article
http://www.hindawi.com/journals/ijta/2008/753064/

Ethical & end-of-life issues

- After acute exacerbations of COPD
  - median survival = 2 years
  - readmission within 6 mo. = 50%
- Pulmonary rehabilitation patients are receptive to end-of-life planning, assisted by rehabilitation educators

Ethical & end-of-life issues

- Patients want information; e.g.:
  - nature of disease process
  - role and limitations of treatments
  - prognosis for survival and QoL
  - planning for future care, including exacerbations

Ethical & end-of-life issues

- Discussions on advance planning
  - are improved by ambulatory setting
  - are improved by skilled communicators
  - should incorporate a team-based approach (including lawyer)

Social & recreational support

- Purposes:
  - decrease anxiety
  - decrease loneliness, sense of isolation
  - improve self-image
  - extend benefits of PR program
- Patient support group; e.g., Better Breathers Club is an instrumental medium.

FYI - click for article on patients' experiences with PR
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2942866/pdf/tids32-1272.pdf

Social & recreational support

- Support for BBC
  - home care, durable medical equipment (DME) companies
  - American Lung Association
  - hospital - social services department
- Location for meetings
  - must be accessible
  - must accommodate special needs

FYI - click for article on starting and running a BBC
http://www.breathingbetterlivingwell.com/basics/pulmonarygroup.php

Social & recreational support

- Publicity for meetings, especially the first one, is necessary
- Monthly meeting days/times - midweek, midday
- Meetings provide:
  - name tags & introductions
  - speakers - stimulating
  - beverages, snacks

Social & recreational support

- Organization - patient board of directors
- Funding
  - no dues
  - fundraising activities
- Social events - aim for fun:
  - birthdays
  - holidays
  - picnics
  - group trips

Social & recreational support

- Encourage wellness & physical activities during, or as the events, e.g.:
  - walks
  - swimming outings
  - dancing
  - aerobics
  - cooking classes
- Encourage social networking; e.g., Facebook, etc.

Summary & Review

- Pharmacotherapy - lesser frequency gets greater adherence
  - immunizations
  - bronchodilators
  - corticosteroids
  - combined medications
  - mucolytics

Summary & Review

- Oxygen therapy
  - indications
  - benefits of LTOT - prolonged survival & increased exercise endurance
  - physiologic criteria
  - prescription
  - home O2 systems & devices - competency-based education
  - travel with O2

Summary & Review

- Respiratory muscle training
  - conditions that benefit - selected COPD patients
  - strength & endurance
  - exercise prescription
  - exercise techniques
  - exercise devices
  - measured outcomes

Summary & Review

- General exercise training
  - rationale - reverse effects of inactivity
  - benefits - increased exercise capacity
  - regimens - aerobics, strength training
  - exercises - legs and upper extremities
  - prescription
  - implementation
  - adjuncts - NPPV, O2, heliox, NMES

Summary & Review

- PR for non-COPD
  - conditions that may benefit
  - goals - same as for COPD
  - program content - specific for disease and patient
  - programs for:
    - asthma
    - cystic fibrosis
    - restrictive lung diseases
    - neuromuscular diseases

Summary & Review

- Special issues
  - outcome assessment - matrix
  - patient adherence, including improvement methods.
  - ethical and end-of-life issues - advance planning
  - social & recreational support - better breathers

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